

# SOLUTIONS OF INDOOR AIR IMPROVEMENT IN CHINA

A market research for NaturVention Oy

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Bachelor's Thesis  
May 2014

Degree Programme in International Business  
School of Business and Service Management



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Author(s) ZENG, Xingxing	Type of publication Bachelor's Thesis	Date 06052014
	Pages 68	Language English
		Permission for web publication ( X )
Title SOLUTIONS OF INDOOR AIR IMPROVEMENT IN CHINA: A MARKET RESEARCH FOR NATURVENTION OY		
Degree Programme International Business		
Tutor(s) NEUVONEN, Heidi		
Assigned by Niko Järvinen of NaturVention Oy		
<p>Abstract</p> <p>NaturVention is a fast growing ecosystem technology company specializing in indoor air improvement. Its core product called FreshWall which can be installed indoors to purify air, adjust air humidity and add aesthetics. This thesis aims at helping NaturVention to understand Chinese market about solutions of air quality improvement, especially indoor vertical garden, and help them form an entry strategy to penetrate China market. The theoretical part of the thesis covers theories of company's growth, internationalization and market entry strategies, buyer decision process and entry uncertainties and barriers.</p> <p>The research method was exploratory case study since the aim was to understand a specific context from a case-company's perspective. Data consisted a combination of secondary and primary data. The primary data, aiming at exploring the buyer decision process, was collected through the non-standardized interviews with well selected participants from each market segment.</p> <p>The results describe a clear picture of the current market situation and upcoming demand for solutions of indoor air improvement and indoor vertical garden. There are a big number of potential customers for NaturVention in China; however, the competitors both from local and abroad haven't dominated the market yet. Entry uncertainties and barriers were studies in order to avoid some risks when the company is penetrating to the Chinese market. Moreover, the insight of the buyer decision process is also valuable to the company.</p>		
Keywords Internationalization, Solutions Of Indoor Air Improvement, Vertical Garden, Buyer Decision Process, Chinese Market		
Miscellaneous		

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# **1 INTRODUCTION**

## **1.1 Background**

For decades, humanity has spent enormous effort on combatting air pollution. However, air pollution is still having increased effect on human health, the environment and the economy. Once air pollution was only an urban phenomenon in industrial countries, nowadays it becomes a worldwide problem. According to Worldwatch Insitute, more than a billion people (about twenty percent of all humanity) live in communities that do not meet the air quality standards defined by World Health Organization. (Air Pollution Now Threatening Health Worldwide, 2013)

The crucial and powerful solutions of air pollution are restricting the main origins of pollutants generating such as energy, transportation and industry, which can significantly improve the air quality in a worldwide scale. Some other solutions like electronic devices or plants that are able to purify air in a small indoor area such as home, office, hospital, classroom, you name it. The vertical garden is a solution of improving air quality, adjust humidity and enhance aesthetic by cultivating plants in a technical way.

The concept of vertical garden is started by a Frenchman Patrick Blanc in 1988. It is a new innovation and environment-friendly approach to improve the air quality, enhance aesthetics of concrete structures, save horizontal space, conserve energy by insulating buildings, and adjust humidity, etc. As the name suggests, the vertical garden offers a vertical greenery growing both indoors and outdoors. Simply put, vertical gardens are living walls which are covered with fauna or vegetation anything from grass to plants or herbs and even vegetables. The wall, as growing carrier of greenery, is covered with a hydrophilic substance and filled with light-weight growth media that is a combination of organic and inorganic material, but hardly any soil. Maintenance is usually simple and there is an in-built irrigation and drainage systems to take care of the watering. Such green wall can last from a decade to 25 years and

offer many advantages. (Vertical garden as a green solution for urban setting, 2013) Sweet & Morrison (2011, 56) also point out that vertical garden is amazing creation by Patrick Blanc since plants can thrive without soil, grow up the sides of city buildings and offer shelter for wildlife and even can provide foods such as vegetables and fruits. Because vertical gardens are essentially a closed system with soilless cultivation, they are often preferred for indoor installations and for large public projects. Vertical gardens can be formed in many flexible ways such as trays, kits, pockets and panels.

Since 1988, vertical garden has been developed in Europe for several decades, and it also stands for the most advanced technology in the global. Vertical garden has been recently introduced to United States, where it has been enthusiastically received by parks departments, schools, restaurants and companies. (Sweet & Morrison 2011, 57) However, it still is a pretty new concept to Chinese people. Mr. Wang Feng, general designer and board member of HSY Landscape Co.Ltd., states out that vertical garden is in an initial stage in China, hasn't been vastly known and accepted yet.( The current situation of vertical garden development in China, 2011)

A Finnish vertical garden supplier NaturVention is targeting to enter Chinese market along with its development and internationalization. Nevertheless, the company has no experience of running a business in China. China market is completely new to them, thus, the management of the company is interested in knowing the market situation of solutions of indoor air pollution, especially vertical garden. A reliable and systematic research will provide them reference when the make decision whether they should enter Chinese market or not.

I have a particular interest in the company's product and the market of solutions of indoor air pollution. I believe that the Clean-Tech cluster has very bright future in China, while Finnish Clean-Tech plays the leading roles in the world. It can be foreseen that there will be a lot of cooperation between those two countries in the

field of Clean-Tech. Therefore, the knowledge, gained through the thesis process, will contribute to my future career development in international trade, marketing or sales in the field such as Clean-Tech cluster.

## **1.2 Vertical garden and indoor air quality**

One of the merits of vertical garden is improving air quality, however, people may wonder its scientificity and would like to know the based theories. Hereby, I will simply explore the effectiveness of household plants working on abating air pollution.

Chen and Lu (2007) point out that there are three main approaches to improve indoor air quality: physical approach, chemical approach and biological approach. Biological approach refers to purify air by cultivating plants indoors. The photosynthesis can transfer CO<sub>2</sub> to O<sub>2</sub>, and the leaves of numerous kinds of plant can sorb practical matters and chemicals. Wolverton, Johnson and Bounds (1989) publish a report to list out the household plants that can abate indoor air pollution efficiently, for example, during a 24-h exposure period benzene removal by gerber daisy is 67.7%, formaldehyde removal by mass cane is 70% and trichloroethylene removal by pot mum is 41.2%.



**Chemicals Removed by Household Plants from a Sealed Experimental Chamber During a 24-h Exposure Period**

	Formaldehyde			Benzene			Trichloroethylene		
	Initial (p/m)	Final (p/m)	Percent Removed	Initial (p/m)	Final (p/m)	Percent Removed	Initial (p/m)	Final (p/m)	Percent Removed
Mass cane	20	6	70	14	11	21.4	16	14	12.5
Pot mum	18	7	61	58	27	53	17	10	41.2
Gerber daisy	16	8	50	65	21	67.7	20	13	35
Warneckei	8	4	50	27	13	52	20	18	10
Ficus	19	10	47.4	20	14	30	19	17	10.5
Leak control	18	17.5	2.8	20	19	5	20	18	10

Note: Plants were maintained in a commercial-type greenhouse until ready for testing. Each test, 24-h in duration, was conducted in a sealed chamber with temperature and light intensity of 30 °C ±1 and 125 footcandles ±5, respectively.

FIGURE 1. Chemicals removed by household plants from a sealed experimental chamber during a 24-h exposure period (Wolverton, et.al., 1989)

The above table shows that some well-selected plants can reduce indoor pollutants significantly. The FreshWall from NaturVention is a concept developed based on this theory.

Moreover, many others also study the effect imposed by plants on air pollution. For example, Thomas Pugh, Ph.D., of the Karlsruhe Institute of Technology in Germany and his colleagues find out that green walls are the most effective green infrastructure for cleaning the air. By doing experiment about the air purifying effect by grass, climbing ivy and other plants, they find out that PM reduced by 60% and NO<sub>2</sub> reduced as much as 40%. (Green Walls, Clean City, 2011)

In a word, vertical garden is a natural and effective method for solving problem of the indoor air pollution. Plenty of experiments and researches have been done to prove its effects. The rapid development of vertical garden in the west also shows its

effectiveness. In the next chapter, I will set forth the current situation of indoor air pollution in China, from where a potential need of vertical garden can be seen.

### **1.3 The case company- NaturVention Oy and its product**

NaturVention Oy is a fast growing ecosystem technology company that located in Jyväskylä, Finland. It was established in 2011 by 3 entrepreneurs, after three years development, it owns 12 employees and 4 entrepreneurs by 2014. The company specializes in designing and producing the green wall, which is one kind of the vertical gardens. So far, the biggest part of sales for NaturVention happens in domestic market. The turnover of 2014 has been estimated to reach 1 million euro.

The company is aiming at solving the global air quality problems by combining nature and technology. The active green wall the company produces is called FreshWall that is designed to work as active décor elements in working and living spaces. The main function of it is to purify the indoor air and adjust humidity, the added value from which is to improve people's health and productivity. The business idea origins from a NASA research which explores the effectiveness of plants in air purification. Based on the research, NaturVention did a further development and gained a patent to the FreshWall. The strongest competence of FreshWall is that it can achieve 100 times more efficient air cleaning than normal plants. So far, it's the only product in the world which can achieve such efficient function.

NaturVention is seeking for an expansion beyond Finland from the very beginning when they started the company. Lawless(2007,106) points out that there are two types of motivation to companies when talk about growth, especially going to abroad. One is that firms proactively seek out of international market opportunities by the owner-managers and the other one is that some owner-managers only consider international market expansion due to growth limit in domestic market. The

growth strategy of NaturVention belongs to the former. The vision of the company is that by 2020 their solutions will make it possible for everyone to have the best indoor air and automatic vertical production of edible plants around the globe. Wherefore, internationalization is a crucial step to be walked out to achieve their vision. Recently, NaturVention has already entered to Russia market, in where they run their business by selecting a distributor. According to Järvinen (2013), China is one of their target markets to enter. Prior to the research I have had a meeting and several times email exchange with him. During these communications, we discussed what I am supposed to contribute is to provide NaturVention an insight into the potential demand for their product in China and to help decide the most suitable entry mode, as well as understand their competitors and their buying decision making process and potential customers. Besides, the entry barriers are researched as well to help the company to reduce risk if they decide to enter China market in the future.

#### **1.4 Research problem, research questions, objectives**

Proctor states out that market research is about researching and finding quantitative facts about a particular market or market segment. The market size or monetary information about the market value or sales statistics is usually researched to conduct a market research. Based on those data, industrial trend, possible future sales can be predicted, and customer specific information such as spending patterns, purchasing power can be gathered as well. (Proctor 2005, 9) While, marketing research problem entails determining what information is needed and how it can be obtained in the most feasible way. (Malhotra & Briks 2003, 41.) Referring to NaturVention, the management would like to get deep understanding about Chinese market of vertical garden, based which they can make decision whether do they enter Chinese market or not. During the research process, I realized that there is no sufficient data about vertical garden especially market size in China. Wherefore, excepting the data of vertical garden, I will also research the market information of

solutions of indoor air pollution in general and also narrow to electronic air purifiers which can provide the company a closest comparison.

The research is conducted with the purpose to answer the questions that are specified as follows:

*What are the market characteristics of the solutions of indoor air pollution in China?*

*Who are the potential customers for NaturVention and their purchasing decision making process?*

*Who are the main competitors?*

Research objectives are the specific components that are worked out by the researcher to answer the overall research problem. (Polondky and Waller 2011, 92.) They provide the author a framework of building up the research design. (McGivern, 2009, 67) To answer the first question, I will identify the vertical garden market situation and also figure out the demand of air purification market in general. As I mentioned before, vertical garden is an emerging product in China, there might be very few existing researches. The market data of electric air purifiers will be collected to be used as a closest comparison to vertical garden market. To answer the second question, the statistic data from main market segments will be collected to provide NaturVention a picture about the market volume, after that I will explore the purchasing decision making process of potential customers. And then I will conduct research into its main competitors. Besides, I will also identify some entry uncertainties and barriers.

## **2 COMPANY GROWTH AND INTERNATIONALIZATION**

To pursue a growth is the target of most of the businesses, even though there are still some businesses prefer keeping same pace as before. In an attempt to compete more effectively, gain more resource, increase profit, satisfy their stakeholders and

attract top talent, company has to consider its growth. Entering new foreign market is one of the growth strategies for company, but, it's a challenge job without doubt. It's crucial for the company to evaluate its business whether it is suitable to be internationalized, be familiar with the difference of entry modes, understand the situation of market segments and to be aware with the entry uncertainties and barriers. The theoretical framework of this thesis is conducted from the concepts mentioned above.

## **2.1 Growth Strategies**

According to Hynes (2010, 89), Storey (1994), Kinsella et al.( 1994), Delmar and Wiklund (2003), Wickham(2004), and Dobbs and Hamilton ( 2007) defines that growth is inevitable for firm's survival, the achievement of its business goals and success, or scaling up activities. Generally, business growth means increased employment, revenue, market share and product development, albeit not necessarily all at the same time. A healthy growing company has the potential to open into new markets and is able to attract investors and employees. There are many ways to obtain a growth such as business expansion in the local and domestic markets, or foreign market penetration or combination of both. Foreign market penetration can be called as internationalization, which is the growth strategy NaturVention adopted to expand their business.

Kotler and Armstrong (2001, 57) creates a useful device to identify growth opportunities for companies. It's called product-market expansion grid.

	Existing products	New products
Existing markets	Market penetration	Product development
New markets	Market development	Diversification

FIGURE 2. Market opportunity identification through the product-market expansion grid (Source: Kotler & Armstrong 2001, 57)

Figure 2 illustrates four types of growth: market penetration, market development, product development and diversification. The strategy of market penetration is to increase sales of current products to current market without changing the product. Market development means identifying and developing new markets for the current products. Providing new products or modified products to the current market is called product development. Diversification is a strategy by starting up or purchase a new business out of the current product and market.

Kotler and Armstrong (2001, 57) also emphasize not to make growth for the sake of growth, instead of it the company must pursue a “profitable growth”. Doyle (1997) identifies growth strategies to three types: radical growth, rational growth and robust growth. Radical growth is unsustainable since it usually achieve astonishing rates of growth but adds little or no real value to customers such as acquisition-led strategies, marketing department strategies, and PR-led strategies. Rational growth reflects the innovation of offering better products with lower prices. Company achieves this growth when it exploits new technology, new market segments or new distribution channels, or a mixture of all three. However, rational growth is not completely sustainable either since the innovation is easy to be copied and this type of growth frequently fails to build long-term customer loyalties. Robust growth is a strategy that seeks to deliver long term value to customer and keep customer loyalty, which can be seen as a sustainable strategy. Such companies pursuing robust

growth understand that there is no specific advantage is sustainable for very long, hence, they learn and innovate continually to keep their competencies. They also know how to cope with knowledge, co-operation and commitment of employees, customers, suppliers and other stakeholders. Industry advantage, strategic assets and core competencies are the three significant things determining robust growth.

## **2.2 Internationalization**

Along with the globalization, business goes abroad vastly. Hynes (2010, 87) states out that internationalization is a route for business growth where companies seek to expand their business beyond domestic markets. A bunch of researches have been done about Internationalization. Hereby, I would like to simply brief this concept and the driving forces as well as the motivation from management. Internationalization means the geographical expansion of business activities over a national country's border. (Matlay 2006; Ruzzier et al. 2006, 476) There are numerous researches related with internationalization both from a variety of viewpoints with a predominately large-firm focus and SMEs. (Svante 2004, 851)

In regard of business characteristics and business environment, three forces driving the internationalization of a business are generally agreed on by researchers. (Acs et al. 2001, 236; Gjellerup 2000, 19). The first is the explosive growth of low-cost technology connecting people and locations. More advanced information-processing and communication technology give a greater awareness of international business opportunities. The second force is the steady dismantling of trade barriers and financial deregulation. Free-trade policies attract more firms to run business in their markets. The third reason is the widespread economic restructuring and liberalization that followed the fall of socialism in Russia and Central/Eastern Europe, and the rapid growth of economy in Asia, particularly in China. Those areas have huge potential markets that provide opportunities for firms to growth bigger. In regard of motivation from management about firm development, Lawless(2007,106) discovers that the reasons inducing internationalization into a dichotomy of positive

and negative factors. Firms proactively seeking out of international market opportunities by the owner-managers belong to positive one. By contrast, some owner-managers only consider international market expansion due to growth limitation in domestic market.

No doubt, the ultimate target of internationalizing is to gain more profit and be more competitive. Hollensen (2008, 35) says that international growth brings new and potentially more profitable markets, helps gain more competitiveness, creates new access to new technology, innovation and product ideas. Albeit the advantages of internationalization entice all companies to be internationalized, not every company should enter a foreign market. Solberg (1997,11) identifies the conditions under which the company's expansion scale ranges from 'stay at home' to 'strengthen the global position'.

		Industry globalism		
		<i>Local</i>	<i>Potentially global</i>	<i>Global</i>
Preparedness for internationalization	<i>Mature</i>	3. Enter new business	6. Prepare for globalization	9. Strengthen your global position
	<i>Adolescent</i>	2. Consolidate your export markets	5. Consider expansion in international markets	8. Seek global alliances
	<i>Immature</i>	1. Stay at home	4. Seek niches in international markets	7. Prepare for a buyout

FIGURE 3. The nine strategic windows ( Source: Solberg 1997, 11)

As the above figure shows, the level of preparedness for internationalization and the characteristics of the industry globalism are the crucial points affecting



internationalization. The more prepared and global an industry is, the more it will make sense for the company to enter a foreign market. Otherwise, a better choice for a company is to develop its domestic market.

## **2.3 Market Entry Strategies**

### **Entry Modes**

Once a company has chosen its target markets abroad it should then consider the best way to penetrate into the target market. A suitable entry mode is a necessity to ensure a smooth entering. Entry modes have been grouped by Hollensen(2008, 215) to assist companies that would like to take advantage of foreign market opportunities: export modes, intermediate modes, and hierarchical modes. Each of these modes entails different levels of resource requirements, organizational control, expected future returns and risk exposure. (Anderson & Gatignon 1986, 17; Buckley & Casson 1998,205)

Hollensen (2007) specifies these three entry groups to thirteen different concrete methods, in order to give a clear and vision- convenient picture to the readers, I make the following chart to illustrate all the entry modes.

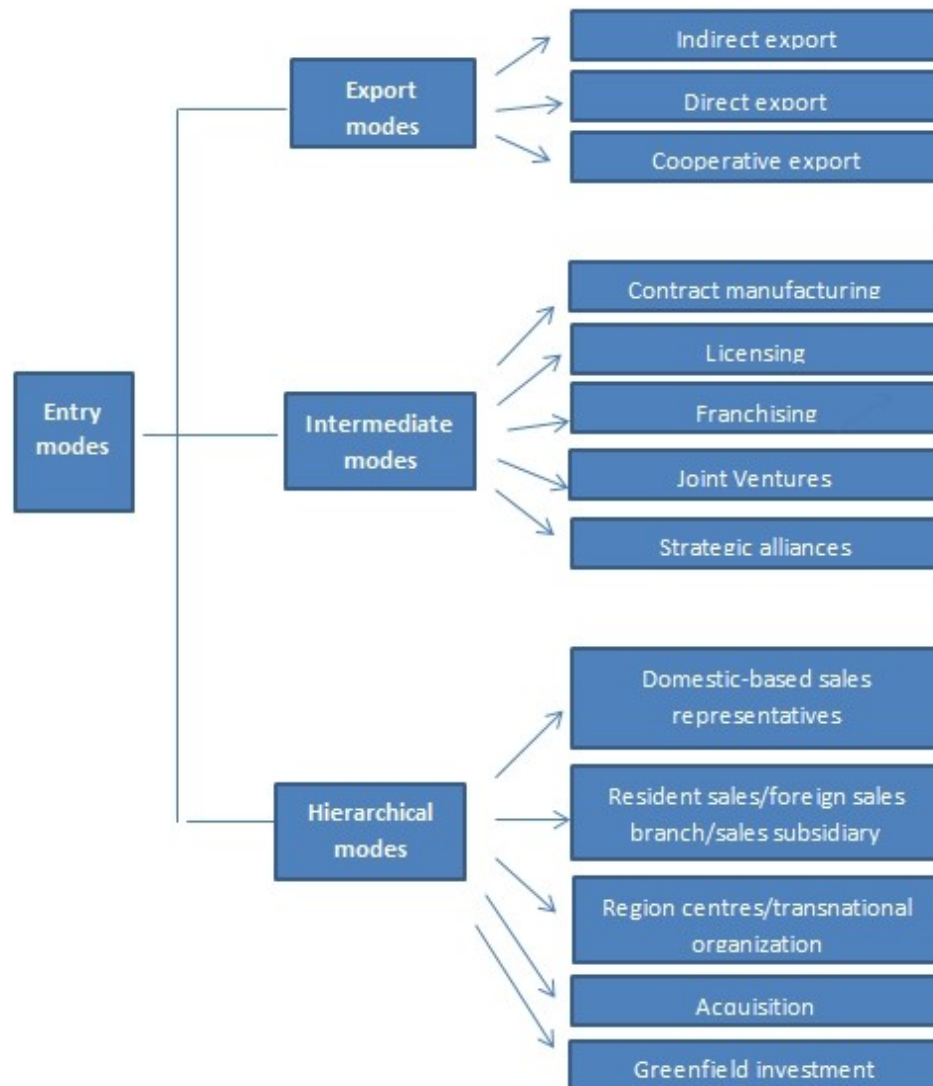


FIGURE 4. Thirteen entry modes (Source: Hollensen 2007)

According to Hollensen (2007), export mode is the most common one for initial entry into international markets. Underneath this mode, a company manufactures its products in the domestic market or third countries and then transfers them to the host market either directly or indirectly. Intermediate entry mode often refers

cooperation between the parent company and selected local partners, such as licensing, franchising, joint ventures, etc. Knowledge and skills transfer from the parent company to its local cooperating parties, and it may also create export opportunities. Usually there is no full ownership involved by the parent company, but ownership and control can be shared between the firm and the local partners. Hierarchical entry mode refers to the type that the firm completely owns and controls the foreign entry modes in the host countries for example through acquisition, subsidiary or green field, etc. The subsidiary or individual body from the host country is fully owned by the parent company. Even though they generate own revenue, but policies and trademark have to be implemented from the parent body. (pp. 310-367)

In short, the three modes have different features according to Hollense (2007).

- Export modes: low control, low risk, high flexibility
- Intermediate modes: shared control and risk, split ownership
- Hierarchical modes: high control, high risk, low flexibility.

The chosen market entry mode has a significant influence on the company's control, risk and flexibility as well as market entry cost. Hollense states out that making the wrong initial market entry choice can threaten the company's expansion and future market entry activities. (ibid., 291-293). Thus, I would like to step to deeper theories about the factors which influence company to choose entry mode in the next.

### **Factors influencing the choice of entry mode**

The entry modes are simply exploited in the previous paragraph. To decide which entry mode is most suitable for a given product or a target country, a company has to considerate from different aspects and factors. Hollensen (2008, 205-210) has grouped the factors to four criteria: internal factors, external factors, desired mode characteristics, transaction-specific behavior.

Internal factors include firm size, international experience and product/service.

External factors comprise the following issues:

- Sociocultural distance between home country and host country
- Country risk/ demand uncertainty
- Market size and growth
- Direct and indirect trade barriers
- Intensity of competition
- Small number of relevant export intermediaries available

Desired mode characteristics are defined from the aspects of risk averse, control and flexibility. Meanwhile, transaction-specific behavior includes tacit nature of know-how, opportunistic behavior and transaction costs.

Figure 3 shows how each factor affects the decision-making of foreign entry mode. By evaluating its own situation accordingly, a company can figure out whether the suitable entry mode to a foreign market closer to internalization or externalization.

Factors affecting the foreign market entry mode decision

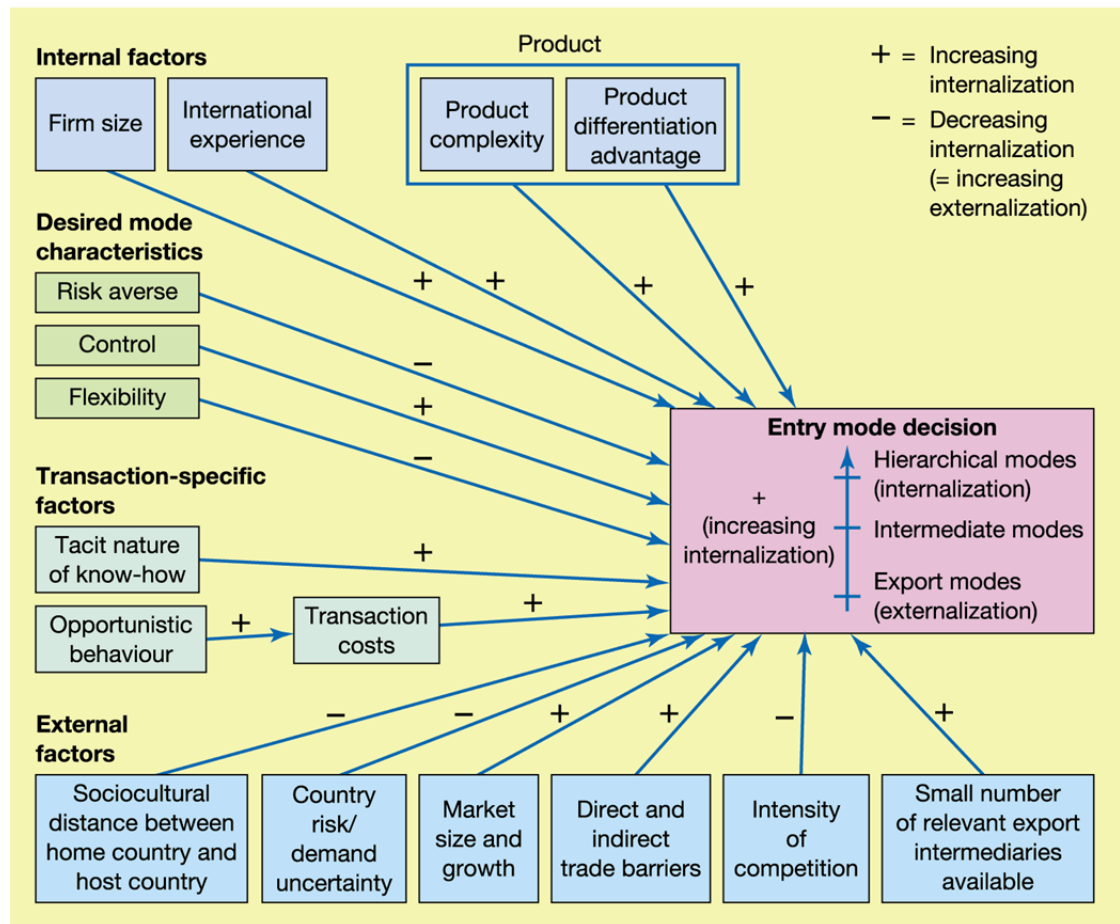


FIGURE 5. Factors affecting the foreign market entry mode decision

(Hollensen 2008, 206)

The figure uses signs “+” and “-” to illustrate the influence of the factors imposing to the entry mode decision whether the entry mode is more towards internalization or externalization. As we can see from the above figure, all the sub-factors from the groups of internal factors and transaction-specific factors impose a positive influence towards hierarchical modes. For example, the larger the company is, the more likely to choose a more internal mode (hierarchical modes). The factors from other two groups have both influences towards internal mode and external mode. For instance, the bigger sociocultural distance between home country and host country, the more external mode can be chosen (export modes).

### **Suitable entry mode to NaturVention**

According to the theory of entry modes, the choice of entry mode differs from the level of control, resource commitment and learning. The lowest in this case are the non-equity modes such as exporting, licensing or distribution agreement. On the contrary, the highest in the case of investment is Greenfield or full acquisition. (Dikova & Brouthers 2009, 219)

Since NaturVention is one of the SMEs, the suitable entry modes to a SME will be discussed here based on previous literature. To make correct decision, the firm owner-managers have to consider 'strategic fit' between the product/service offering of the firm and the demands of a different cultural, social and economic international business landscape. (McGee et al. 2005) Compare to large company, small firms typically have limited resources and lower threshold of risk absorbing in international market. Therefore, export mode and some types from intermediate mode can be good choice for SME as a compensating of lacking resources such as licensing, franchising, joint venture/strategic alliances or partnership. (Nummela et al. 2006, 562-583)

In regard of NaturVention, the factors affecting the foreign market entry mode decision has been evaluated to NaturVention, see Appendix 1. The evaluation is made based on email interviews to Järvinen. Comparing with the Figure2, the externalization mode such as some intermediate modes and export modes are better choices to NaturVention than hierarchical modes. To make a further analysis, the patented technology is main competence to NaturVention, certainly, the chosen entry mode should avoid to fostering future competitors. Therefore, the modes such as licensing, franchising that may train future competitors are not good choices in this case. Besides, the cost is a crucial reason limit vertical garden to be accepted vastly in China. The entry modes which can reduce cost shall be considered, for example export modes, partnership, contract manufacturing.

## 2.4 Market Segments and Buyer Decision Process

### Market segments

Kotler and Keller (2009) state out that in the past some companies have practiced a concept of mass marketing which is to offer one single product to all buyers, the argument for this kind of marketing is that it creates the largest overall potential market for the offering resulting in lower cost in marketing, production and distribution. But nowadays, mass marketing is dying out and micromarketing gradually becomes the mainstream amongst most of companies, which includes the following four levels: segments, niches, local areas and individuals.

Kotler and Keller also point out that it is not possible for companies to connect with all potential customers in the large, broad or diverse markets. Therefore, market should be divided into groups or segments based on the particular needs or desires. The company should make tailored marketing activities or products to fulfil the requirements of different groups or segments. To be able to develop an effective marketing plan, the company should understand the consumer behaviour and the main differences between each segment. (pp. 247-250)

As it is mentioned in Chapter 1.4, the FreshWall can enhance the indoor air in very working and learning space to ensure more efficient, innovative and less sick leaves to people. The company mainly focuses on four market segments in its domestic market where most of their business has been operating in. Those four market segments are: education sector, healthcare sector, beauty and wellbeing sector and sports sector. Järvinen (2014) says that Chinese market is completely new to them, the focusing market segments may remain the same as in Finland or they also can be difference. We agree that excepting those four market segments, I will also research statistics from enterprisers and government sectors.

## Buyer decision process

It's crucial to understand the purchasing decision process of the customers from targeted entry market for a company which attempts to operate business there. It is the stage a customer passes through in making choices about which products and services to buy. Kotler and Armstrong (2001,193) state out that the buyer decision process consists of five stages: need recognition, information search, evaluation of alternatives, purchase decision and post purchase behavior.



FIGURE 6. Buyer decision process (Source: Kotler & Armstrong 2001, 193)

According to Kotler and Armstrong (2001), Need recognition is the first step of the buyer decision process in which the consumer recognizes a need or problem. It can be triggered by internal stimuli such as feeling hungry, and external stimuli such as needing a new hobby because have more spare time, etc. After arousing a need, the consumer either has satisfied information about the product at hand or need to actively search information. The information can be searched from several sources: personal sources (family, friends, neighbors, and acquaintances), commercial sources (advertising, sales people, dealers, packaging, displays, web sites), public sources (mass media, consumer-rating organizations), and experiential sources (handling, examining, using the product). As more information is gained, the awareness and knowledge of the available brands and features increase to the consumer. Thus, the consumer moves to the next stage: to evaluate the alternatives. Usually consumer evaluates the options by going through several processes at same time. In the stage of purchase decision, the consumer actually buys the products. Post purchase



behavior reflects to the relationship between the consumer's expectation and perceived performance of the products. The smaller the gap between expectations and performances is, the greater the consumer's satisfaction is. To understand the post purchase behavior can work on satisfying customer and reach a higher customer retain and loyalty. (pp.193-197)

## **2.5 Entry uncertainties**

According to Ahsan and Musteen (2011, 376), Miller and Shamsie (1999) state that uncertainty means that one cannot determine the probability of an outcome because of the lacking information about the course and effect of a relationship. Uncertainties have been investigated explicitly by previous researchers as influencing an entry-mode decision include cultural uncertainty, behavioural uncertainty, political uncertainty, policy uncertainty, market uncertainty, demand uncertainty and exchange rate uncertainty.

Nevertheless, cultural uncertainty and institutional uncertainty are the two most widely investigated types of entry uncertainty. (Brouthers 2002, 205). Cultural uncertainty includes the differences in language, work ethics, values and social structures between home country of the company and host country. Tsai and Cheng (2002, 63) point out as cultural uncertainty increases the firms are more likely to enter the host market with a low-control mode. The reason is that the higher cultural distance between the home country and the host country is, the more difficult a market entry will be. In addition to cultural uncertainty, institutional uncertainty has a significant influence on entry mode choices as well. Institutional uncertainty has been described as changing of political and legal conditions. Pak and Park (2004, 5) figure out that firms usually choose a high-control mode when institutional uncertainty is low.

## 2.6 Entry Barriers

Pehrsson (2008, 66) mention that Shepherd (1979) categorizes the barriers to entry as either exogenous or endogenous. The exogenous barriers are underlying market conditions, which firms are not able to control. By contrast, the endogenous barriers come from the firm's market strategies and their competitive behavior when they face new entrants.

According to Keegan (2002, 279), Porter (1980) studies the barriers a little further and assorts eight major sources of barriers to entry: economies scale, product differentiation, capital requirement, one-time switching cost, access to distribution channels, government policy, cost advantages, and expected competitor response. According to him, economies of scale shows the decline in per unit product costs as the absolute volume of production per period increases. Hence, when incumbents achieve significant economies of scale, it will be difficult for new entrants. Product differentiation refers to the uniqueness of the product. A high level of product differentiation can increase the difficulty of an entry. In an industry requiring enormous capital investments, potential entrants will face more pressure. One-time switching cost means the cost caused by the change suppliers or products. The perceived cost to customers of changing to a new competitor's product may bring an obstacle preventing new entrants from achieving success. The access to a distribution channels can be barriers to the entrants if the existing one is expensive to enter or not fully available. It means that the entrants have to create their own distribution channels. The government policy definitely cannot be overlooked, which often restrict competitive entry. Established incumbents usually enjoy the cost advantages independent of the scale economies that present an entry barrier. Usually, the new entrants expect the incumbents to strongly respond to their entry, which will give them an unpleasant experience. This belief may serve as a strong deterrent.

### **3 RESEARCH METHOD**

#### **3.1 Research design and strategy**

The research design is a general plan about answering research questions. It contains clear objectives, derived from the research questions, specifies the sources from which the researcher intends to collect data and consider the constraints that the researcher will inevitably have (Saunders et al. 2009, 137). In the research method's literature, research purpose can be classified to three types: exploratory, descriptive, and explanatory. (op.cit.p.139)

Exploratory study is often suggested to be used if the researcher would like to understand a problem, for example if she/he is not sure about the precise nature of the problem. Regards to the purpose of my thesis, I would like to get a deeper understanding of the current market situation about solutions of indoor air pollution in China. The new aspects of phenomena and knowledge might be revealed as a result of the research. Therefore, the exploratory study is the most appropriate type to me.

According to Saunders et al. (2009, 145), Robson (2002) defines that case study is a strategy for investigating a particular contemporary phenomenon within its real life context using multiple sources of evidence. My research questions are mainly formulated as "What" type, which influences me to choose case study strategy it has considerable ability to generate answers to questions such as "what", "why" and "how".

During the research process, there are some constraints I faced. For example, I cannot find enough secondary data since vertical garden is a new thing in China and there is not too much research concerning it yet. And I don't have too much time to

focus on this research every day because of my new born. Moreover I am not able to travel back to China and conduct face to face interviews to my chosen respondents.

### 3.2 Data collection

Yin (1994) states out six sources from where the researchers can collect data for case study strategy: documentation, archival records, interviews, direct observation, participant observation and physical artifacts. To execute my research, I apply to secondary data collection and interview.

The data can be identified as primary and secondary data. Secondary data is which has been collected for some other purposes. Saunders, et al. (2009, 258) group secondary data to three types: documentary data, survey-based data and multiple source data.

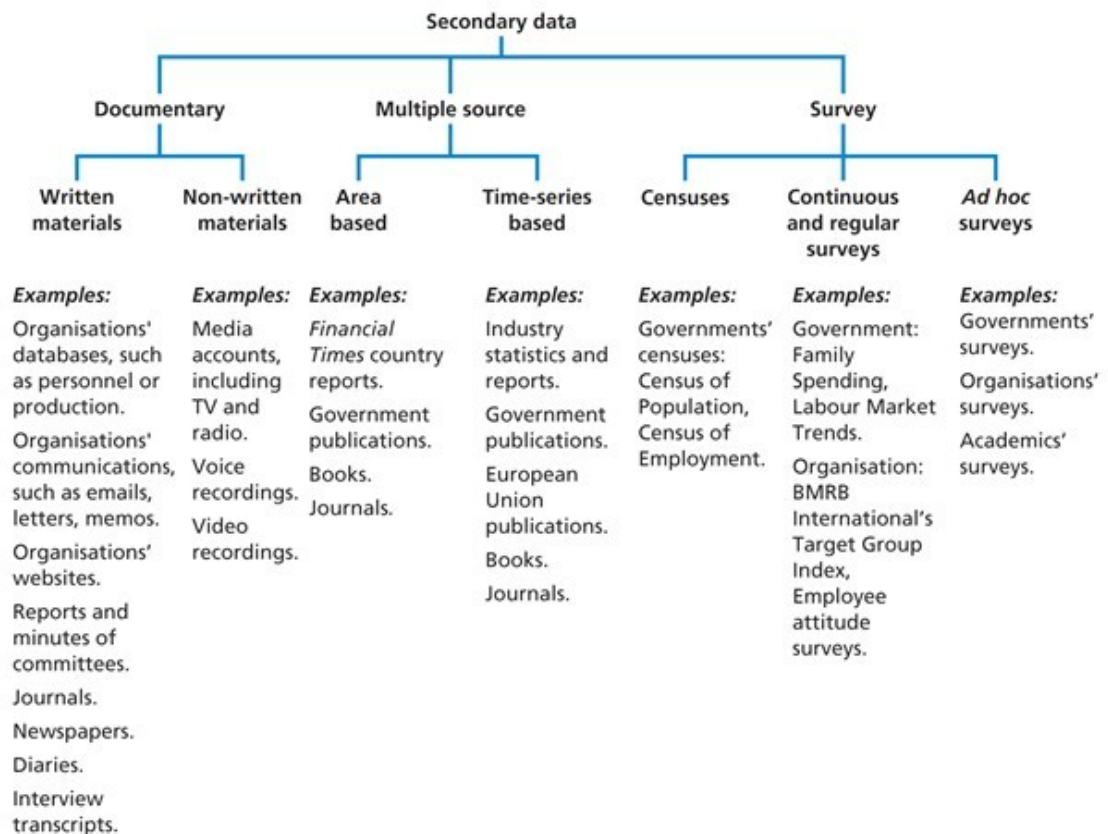


FIGURE 7. Types of secondary data (Source: Saunders, et.al 2009, 259)

During the secondary data collecting process, I have collected data from all the three sources. For example, I collected data about NaturVetion and its competitors from their websites which belongs to written materials. Most of the articles concerning vertical garden are publications from journals and magazines, meanwhile, I widely used governmental and business sources to access industry report, market statistics, etc. The online full-text databases such as Emerald and Baidu Wenku (a Chinese online database) provide me a good range of articles from where I obtain the theoretical basis of my thesis and find the current trends in the studying subject. In order to get more useful articles, I even paid to be a member of Baidu Wenku to get more right to read and download articles there.

Saunders, et al. (2009, 318) mention that Kahn and Cannell (1957) define interview as a purposeful discussion between two or more people. Nowadays there are several different typologies to categorize interviews. The typology I would like to use differentiates between: standardized interviews and non-standardized interview (Healey and Rawlinson 1994).

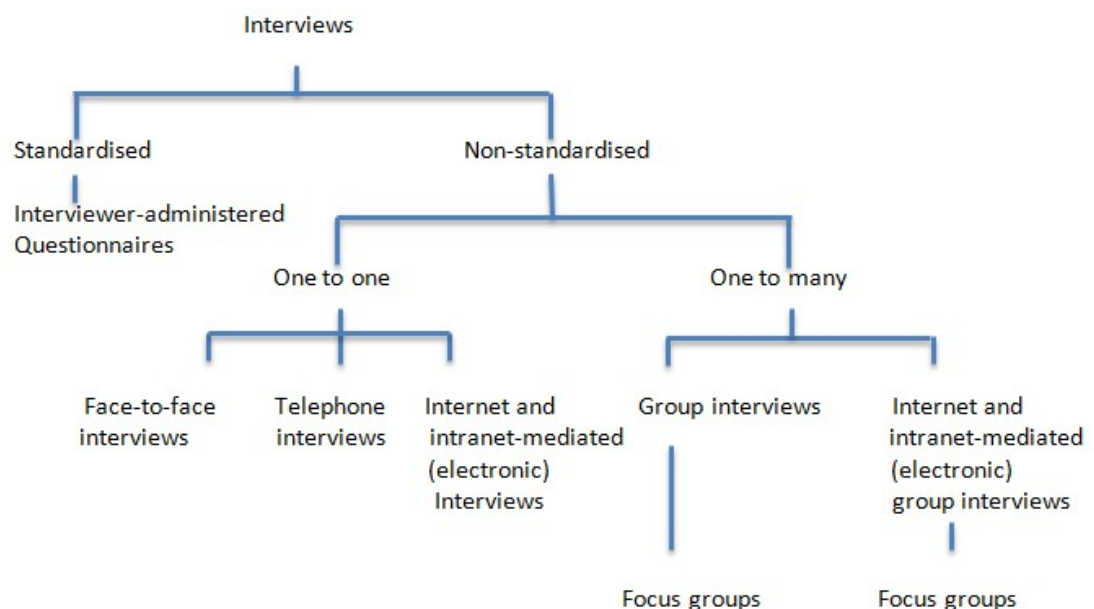


FIGURE 8. Forms of interview (Source: Saunders, et al. 2009, 321)

Standardized interview can be seen as an interviewer-administered questionnaire. Usually the researcher needs to read out each question and record the response on a standardized schedule. Non-standardized interviews cover a list of themes and questions. During the particular interviews, some questions can be omitted or added, the order of the questions can be varied from interview to interview depends on the conversation. The data will be recorded by audio-recording the conversation or perhaps note taking. (Saunders, et al. 2009, 320)

In order to gain an insight of customer buying decision process from the focusing segments for NaturVention, I conduct a non-standardized interview via Email and QQ (a Chinese online chatting tool, similar with Skype) since I'm not able to conduct a face-to-face interview. Because of the time difference and people's schedule, it is challenge to meet my interview participants online for long time. Therefore, I first send my interview questions via email to them and reserve a time with them for asking more questions based on their answers after they reply me. All the data have written record.

The participants for the interviews were well selected from different market segments NaturVention focuses on. Most of them are management who have clear understanding about buying decision process and also have power to make buying decision in their organizations. For example, one of my interviewees is from Civil Defence Bureau who is taking charge of building up and decorates a new office building for his organization. He recently has thought about the air purification issues. Another one of my interviewees is a CEO from an investment company who is now doing a project about household products who also pays much attention to indoor air quality. I believe that their answers will provide me high valuable information. The following TABLE 2 will simply introduce the interviewees.

Segments	Position	Organization
Enterprises sector	CEO	An investment company
	Procurement Director	A multinational company
Education sector	Vice Principal	A vocational school
	Teacher	A primary school
Health care sector	Doctor	A hospital
Government sector	Supervisor	Civil Defence Bureau
	Financial planner	Financial Bureau
Beauty and wellbeing sector	Owner	A Nutrition club

TABLE 1. List of the interviewees

### 3.3 Data analysis

The data collected from the non-standardized interviews can be characterised as qualitative data which refers all non-numeric data or data that have not been quantified and can be a product of all research strategies. They need to be analysed to provide clear and understandable information (Saunders, et al. 2009, 480.)

Qualitative analysis generally involves one or more of: summarising data, categorising data and structuring data using narrative to recognise relationships, develop and test propositions and produce well-grounded conclusions (op.cit.p.516).

I conduct the interviews via Email and QQ, therefore I have all data in written form which needs much less time to transcribe them into a formalized pattern. As the interviews are conducted in Chinese, an English version of the formalized data has been done in order to provide a readable text for further analysis. During the next step of summarizing data, I gain a better understanding about the themes. The third step is called categorizing data that involves two activities: developing categories and attaching thesis categories to meaningful chunks of data. I develop the categories

based on the theoretical framework and try to figure all the relationship between them. At last I draw a conclusion based on the above procedures to offer a meaningful explanation for the relevant research questions and objectives of the thesis.

According to Saunders, et al. (2009, 489), there are two approaches concerning data collection and analysis: deductive approach and inductive approach. By using the existing theory to shape the approach that the researcher adopts to the qualitative research process and to aspects of data analysis is deductive approach, by contrast, inductive approach refers to build up a theory that is adequately grounded in the researcher's data. My interviews are formulated from the existing theories, wherefore, I apply to a deductive approach. Yin (2003) also suggests that the researcher can use the theoretical propositions as a mean to help her/him to organize and direct the data analysis.

### **3.4 Research ethics**

A good interview has to be conducted in an ethical way. Saunders, et al. (2009, 184) define that the research ethics relates to apply a moral and responsible attitude on research questions formulation, research design, access gaining, data collection, processing and storing, data analysis and findings writing.

During the whole process of research, I behave properly according to the research ethical principles. The purpose of the interview is fully informed to the participants beforehand and also state that they have right to refuse participating. I will not reveal the participants detailed personal information since the privacy of them is promised to keep, and also maintain the confidentiality of data provided by them. Respect the participants' reactions and avoid discomfort, harm and pain during the process of data collecting. And I also try to behave objectively as a researcher.



## **4 THE CHINESE MARKET OF SOLUTIONS OF INDOOR AIR POLLUTION**

In this chapter, I will first disclose the current situation of indoor air pollution in China and figure out there is demand of solutions of indoor air pollution. Following I will present the market concerning environment protection in general by statistics. Among the solutions of indoor air pollution, air purifier is the key trend in China nowadays, thus, the relevant marketing information is disclosed as a comparison to NaturVention to understand how big market it is. After that, the current situation of indoor vertical garden will be stated out, as well as market segments and customers buying decision process, competitors and entry uncertainties and barriers.

### **4.1 Indoor air pollution in China**

#### **PM2.5**

Recently, many domestic and overseas media have disclosed PM2.5 (Particulate Matter) figure of air quality in China. The severe pollution in many cities of China strongly caught people's attention. PM, abbreviated from particulate matter, is very small dust and soot particles. PM consists of a number of components. Soil, dust particles and certain metals are emitted directly into the air as PM. The dust resulting from construction site and agricultural activities, combustion products from solid fuels, carbon black and soot are all the components of PM. PM2.5 is matter that is 2.5 micrometers or less in diameter. (Source: Utah. gov. Services, 2013)

People living in a place with PM exceeding the standard content may have a higher risk of heart or lung diseases such as asthma, chronic obstructive pulmonary disease, congestive heart disease, or ischemic heart disease. PM can increase the susceptibility to respiratory infections and can aggravate existing respiratory diseases. (Bi 2012, 205) Xie, et. al (2009, 1036) point out that PM2.5 has strong influence on respiratory death and cardiovascular death. They further find out that

when a PM<sub>2.5</sub> concentration is increased by 10 µg/m<sup>3</sup>, a 0.40% increase of all-cause mortality, a 1.43% increase of respiratory death and a 0.53% increase of cardiovascular death would follow.

Albeit the air quality measurement result available on the internet is an open-air reading, it still can illustrate the quality of indoor air. According to the Environment Measuring Center of China National Interior Decoration Association, the indoor air pollution is usually two to three times more severe than outdoor air, and it can be even 100 times more severe in some particular cases.( CHINANNEWS.COM, 2013)

Appendices 1 implies the Air Quality Index (AQI) which can shows how polluted the air is based on the figures of PM<sub>2.5</sub>. (Source: Real-time Air Quality Monitoring <http://aqicn.org/city/beijing/>)

On the website of Real-time Air Quality Monitoring, I have been exploring the AQI of seven Chinese cities that are quite well developed and more or less are industrialized cities, and some of them such as Beijing, Shanghai, Guangzhou, Hongkong are megalopolis. The following figures were cited from the website on 25, October, 2013.

City	Beijing	Shanghai	Guangzhou	Chengdu	Nanjing	Suzhou	Hongkong
PM <sub>2.5</sub> Value	112	112	152	172	109	144	143

TABLE 2. Real-time Air Quality Index (AQI) (25.10.2013,04:43)

(Source: Real-time Air Quality Monitoring,2013)

It obviously shows that the air quality in those cities falls below the healthy level for sensitive groups and the unhealthy. People living in such an environment risk their health; consequently, air purifying solution is an exigent need for them.

## **Other pollutants**

Along with the development of building technology, the insulation and sealing of buildings are more effective than before in China. Its drawback is that it prevents the polluted air from flowing out. Nowadays, indoor air in cities is several times more polluted than outdoor air. ( Xie, et. al. 2009). For the sake of cost savings, a lot of chemicals are now included in construction materials, insulation materials, decoration materials, coating materials and painting materials, for example formaldehyde, benzene, and chlorine hydride, etc. Formaldehyde, benzene and chlorine hydride are known to cause cancer. In addition, office electronic office equipment and domestic appliances emit electromagnetic waves, static and ultraviolet radiation that pollutes indoor air to a great extent.

## **4.2 Market of solutions of indoor air pollution in general**

From chapter 1.3, it can be seen that the indoor air pollution is nowadays pretty severe in China, consequently, there must be a big need of solutions. Since there is no market volume research has been found out concerning vertical garden in China. I start the research from a macro level of the environmental protection and the air purifying in a single city such as Beijing. And then I conduct market volume about electronic air purifier, which can give a closest comparison to NaturVention.

According to the programs made for the Chinese twelfth 'five –year-plan' (from year 2011-2015), environmental protection is a significant part. Chinese Premier Li Keqiang mentioned that in order to improve the living environment, China will invest 3,400 billion CNY (about 400 billion EUR) to the field of environmental protection. (Chinese government will impose more effort on abating air pollution, 2012). Capital city Beijing plans to invest 760 billion CNY (about 89 billion EUR) to abate PM2.5 from

year 2013 to 2017. The budget of environmental protection of 2014 is 10.7 billion CNY (about 1.3 billion EUR), which has a 45.1% increase comparing to year 2013. (Hundreds billion for controlling PM, where does Beijing get money, 2014)

From the giant numbers above, it can be seen that there is a huge market for environmental protection solutions in China, which definitely includes indoor air pollution solutions. According to a research named 'Market Research and Investment Prospects Analysis Report on Air Purifier (2013-2018)', during the period of the eleventh 'five -year- plan' (2006-2010), the gross value of electronic air purifier and other environmental protection products is over 40 billion CNY (approximate 4.7 billion Euro). The average profits of general environmental protection products reach 28%, meanwhile the demand of air purifier has a 27% increase every year. In 2012, the value of solutions of indoor air pollution reached 30 billion CNY (about 3.5 billion EUR). It's estimated that it will keep a 28% increase every year. To year 2017, the market volume of air purifier will hit 90 billion CNY (about 10.5 billion EUR).

### **4.3 Indoor Vertical Garden in China**

According to He, et al. (2003, 289), and Wang, et al.(2006, 104), as the developing of urbanization in China, land spaces are shrinking. Limited land and Chinese traditional building style allows very little space for green. But, green is required strongly in the aspects of aesthetics, air quality improvement, humidity controlling and so forth. Therefore, vertical garden draws people's attention gradually.

Sun (2011, 187) states out, vertical garden, especially cultivated in the exterior wall of a building has started to catch Chinese's eyes. It's an important signal of inducing ecologic and low carbon life. Several pavilions in Shanghai Expo 2010 have adopted vertical garden in their design, which spreads this concept to a large number of visitors. He concludes three forms of indoor vertical garden in China: imbedding

greenery, hanging greenery and green wall. Concaves in the wall are used to put potted plants, which is called imbedding greenery. Hanging greenery means that vine plants are hanged indoors. The third type very closes to the concept of FreshWall. The former two types of vertical garden are more common in China nowadays. However, the third one is a new concept for Chinese greenery design, and it's also not widely used yet. So far, not many samples of indoor green walls can be seen in China.

The benefits of green wall have been studied by several researchers and some relevant articles are published in China. It can be seen that the researchers are working on introducing this concept to more people. During the researching, I realize that an increasing number of local suppliers and foreign suppliers are attempting to fill the vacancy of this market. As a leading supplier of vertical garden in China, Hannor believes that the indoor green wall is a future trend on improving air quality, adjusting humidity and creating aesthetics. (Hannor Official Blog, 2013)

Moreover, not only building designers and scholars encourage taking vertical garden as a solution of improving air quality, but also many city municipalities have announced documents to push the implement of vertical garden. In 2011, Beijing City Municipality issued a document to encourage the relevant government departments to take roof greenery and vertical garden into consideration as an approach to improve the living conditions. (China Landscape Architecture, 2013) Likewise, a great number of city municipalities in China push on the building greenery as one of the approaches to improve the air quality. In the document 'Vertical Garden Standard' issued by Xiamen Municipality, space for setting up vertical gardens must be reserved when the new buildings are been designing. (Sina, 2011)

During the research, I find out an interesting phenomenon that the rooftop greenery got more attention than the indoor vertical garden from the architects, municipalities and relevant associations. According to Yu Weihong ( Chief architect,

Zhejiang Jiahua Architectural Design Institute,2013), when 70% building in the city have rooftop greenery , the CO<sub>2</sub> shall be reduced by 80% in the air, and the temperature shall be lowered 5-10 degrees during the summer, which means that the heat island effect shall be mitigated almost.

As cost-effective approach, rooftop greenery has been written in the architectural rules in many cities in China. In order to encourage more rooftop greenery, municipalities give financial allowance to support the implementation of conducting rooftop greenery. During the period of the eleventh ‘five -year -plan’ (2006-2010), the first Evaluation Standard of Green Building was issued, in where rooftop greenery and vertical garden are mentioned. On other hands, rooftop greenery is obligatory nowadays in China and it has huge market. Take Guangzhou city as an example, the total area of rooftop is more than 160,000,000 square meters, which is still getting enlarged every year by 1,000,000 square meters. (Hannor Official Blog, 2013)

#### **4.4 Potential customers and buyer decision process**

##### **Profile of potential customers**

In the chapter 2.4, it has been discussed that I will conduct research from the following segments: education sector, healthcare sector, beauty and wellbeing sector and sports sector, as well as enterprisers and government sectors. Herein, I collect the data from National Bureau of Statistics of China. Unfortunately, as for the figures about enterprises and employees, the latest data is from the year of 2001. The statistics of beauty and wellbeing sector and sports sector are not found out. Besides of those market segments mentioned above, I believe that the wealthy private residents can be potential customers to NaturVention as well since it’s a class who pursues high quality life and do not have budget limitation to own a FreshWall at

home. Therefore, a research concerning wealthy private residents has been done as well.

Schools	Quantity
Primary schools	228,585
Junior middle school	53,216
Senior middle school	14,205
Vocational schools	12,663
Colleges	1,297
Universities	1,145
Total	311,111

TABLE 3. The quantity of schools in China (Source: National Bureau of Statistics of China, 2013)

TABLE 3 shows the quantity of schools in China in year 2012. More than 300 thousand schools is a promising market for NaturVention. Moreover, the figures do not include the quantity of kindergartens and other educational institutes, which are certainly a huge number.

Health Care Institute	Quantity
Maternity and Child Health Hospital	3,044
Polyclinic	15,021
Chinese Traditional Medical Hospital	2,889
Specialized Hospital	4,665
Community-level Medical and Health Center	912,620
Other Level Medical and Health Center	71,269

Rural country hygiene Center	690,516
Public Health Agency	12,083
Ambulant Clinic	187,932
Centers for Disease Control and Prevention	3,490
Specialized Disease Prevention Center	1,289
Health Supervision Institute	3,088
Total	1,907,906

TABLE 4. The quantity of health care institutes in China (Source: National Bureau of Statistics of China, 2012)

TABLE 4 tells the amount of organizations from health sector such as hospitals, clinics, health agency, disease prevention center, health supervision institute, etc. As we can see that there are more than one million relevant organizations, clearly, there are a great number of potential customers.

	<b>Enterprises (in 10 thousand)</b>	<b>Employees (in 10 thousand)</b>
State-owned	36.9	5056.8
Collectively-owned	85.8	3763.1
Private	132.3	3170.3
Share holding	30	2746.6
Foreign investment	5.7	644
Hongkong, Macau, Tanwan investment	8.2	997.4
Others	3.7	124
Total	302.6	16502.2



TABLE 5. The amount of enterprises and employees in China (Source: National Bureau of Statistics of China, 2001)

Total asset (Yuan)	Quantity ( in 10 thousand)
Less than 1 million	229.8
1-10 million	57.7
10-100 million	13.1
Above 100 million	2
Total	302.6

TABLE 6. Enterprises' scale (Source: National Bureau of Statistics of China, 2001)

Even though those figures cannot exactly illustrate current situation about the quantity of enterprises and employees, it still can show that there is a huge number of enterprises and employees in China. And from 2001 to now, China has a remarkable increase in economy, in another word, the quantity and company asset definitely have been also increased. In year 2001, the exchange rate between Euro and CNY was about 7.5. (EUR- CNY exchange rate, 2001). Even only consider the companies with total asset over 1 million CNY (approximate 133,000 EUR), there are about 72,800 ones. There is very promising market for NaturVention since the base number is huge.

Moreover, I believe that the wealthy private residents can be the third market segment for NaturVention. Albeit the average private residents might be not able to afford the FreshWall at home, however, as a country that has the biggest wealth gap in the world, China also have a large number of wealthy households. According to a study from McKinsey & Company (2009), the number of wealthy households with an annual earning \$ 36,500 (about 26,200 EUR, the spending power roughly equal to \$ 100,000 to a USA household) hit 1.6 million in 2008, and will increase to more than

4.4 million by 2015. Those people pursue a high quality life and can afford costly products. The research also points out that 52% of the wealthy people trust foreign brands. It means that, as a foreign brand, NaturVention is more competitive than the local suppliers.

### The analysis of the interviews

The questions of the interviews are formulated based on the theory of buyer decision process, which targets to understand the influences that affect buyers during the different stages. However, none of the participants has purchased green wall so far, so I focus on exploring the influences in the stages of need recognition, information search and evaluation of alternatives.

### Need recognition

The main functions of green wall are purifying air, adjusting humidity and improving aesthetics indoors. Almost all the participants mention that the air quality both outdoors and indoors are poor, and they think that it's very necessary to install some devices to improve the air quality indoors since people spend most of their time indoors. Only one participant satisfies his living and working environment since he locates in Hangzhou City that is one of clearest city in China. In all, there is a need of green wall can be seen from their answers.

*"... the notorious PM2.5 figures disclosed by some organizations draws my attention to air quality, the air is polluted outdoors and definitely affect the indoor air quality... I think it's very necessary to improve the air quality indoors since most of the time we spend indoors..."*

*“... air quality is very poor, need to install some devices to improve air quality...”*

#### Information search

According to Giele (2009), the most preferable channels to reach Chinese customers is TV advertisements, following are newspaper advertisements and sponsorships. The most powerful way to win customer is recommendations from people who close to the potential customer. But in this case, about half of the participants haven't heard about green wall before, they prefer seeing a sample from where they can understand how it looks and how it works on improving air quality. An advice has been given out that keep showing the air quality values both from the room where has been installed a green wall and other places without it. The figures are the best tool to convince potential customers. Following by it, TV advertisements is also a good way they prefer since there are quite strict rules for TV channel to broadcast an advertisement. In another word, it's more reliable compare to other channels such as social media. Specialized magazines such as business magazines or interior decoration magazines are another channels customer can get relevant information because the people who have power to make buying decision are often read magazines instead of watching TV.

*“ ... well, it's nice to have look a sample, then I can know it better such as how it works on improving air quality, if they can show the air quality index to prove it really works...”*

An interesting finding from the interviews with the participants from government sector reveals that government purchasing is fulfilled through different means in different city, for example in Hangzhou City, purchasing is made through a special internet platform. In order to reach and make sell to this government sector, the company has to find way access to that platform. In Beijing City, bidding is used to

select suppliers. In this case, the company has to enter to the shortlist of the bidding tender.

#### Evaluation of alternatives

Regard to the alternatives, I formulate the questions from two levels. Firstly I would like to figure out whether they prefer electronic products or greenery products. Majority of them prefer greenery products because they are natural, environmental friendly and artistic. Electronic products win two interviewee's attention because it is simple and effective.

Secondly I explore the factors influencing the buying decision making among different suppliers of green wall. When choose the product, technology, price, and installation and maintenance are the most important factors they consider. Most of them think that how well the green wall can improve air quality is the key point which can persuade them to decide a purchase. Price is another crucial factor which can influence their purchasing decision. Installation and maintenance are also very important since people are busy in the modern society; therefore, they require installation and maintenance should be easy and simple. One interviewee emphasizes that the consumer right protection is also very important especially the supplier is a foreign company. It happens sometimes the foreign company withdraws from Chinese market causing consumers fail to protect their rights.

*"... technology is definitely very important, as well as the installation and maintenance, if they are too complicated to install and maintain, I won't consider buy them... Price should be affordable, 3000-4000 euro is not cheap... couple euro per month for maintenance is also not cheap if you transfer it to CNY..."*

*“... when talk about the foreign supplier, I care the consumer right protection very much. I have to know where I can protect my right if the company withdraws from China... I suggest it uses a well-known and big dealer...”*

Excepting one interviewee, all others show a strong preference towards a western supplier on condition that the price between products of domestic and western supplier is not significantly different. One interviewee even is willing to pay higher price for more quality products. She points out that the western products usually have more advanced technology.

#### **4.5 Profile of competitors**

Alsem K.J. (2007,133) figures out four levels of competition: product form competition, product category competition, generic competition and budget competition. Product form competition refers to the competition amongst brands that focus on the same market segment. Product category competition exists amongst products sharing comparable characteristics. Competition amongst products that respond to the same needs of consumers is called generic competition, and competition for the money from consumer is called budget competition. Simply, other vertical garden suppliers that provide indoor green wall to target the group who is attempting to use greenery to improve the indoor air quality and aesthetics have product form competition to NaturVention, while the suppliers providing greenery in the purpose of improve air quality and aesthetics compete to NaturVention in the product category. Generic competition is in a larger scale of air quality improving devices such as electronic air purifier. Plenty of products can be budget competition elements to FreshWall such as furniture, electric appliances and so forth.

From the above, it can be seen that NaturVention has competition in all the four levels. However, information about the competitors from the former two types offers more value to the company as they have more direct competition to each other. Main local vertical garden suppliers and foreign suppliers that already entered to China are analyzed in this chapter.

**RainSunWall**, located in Shanghai, is operated by an architecture consulting company. It established in 2007 by introducing vertical garden technology from France, and it becomes the leading brand in vertical garden field in China after five years specializing in development and localization of the technology. Its products have competences in ecologic botany, non-soil cultivation, drip irrigation technique, automatic control system and remote monitoring system. As a subsidiary operated by an architecture consulting company, the core competence of RainSunWall is combination of European advanced vertical garden technology and its rich working experience in architectural industry. It has two series vertical gardens: outdoors large scale vertical garden and indoors small scale vertical garden. So far, the company has supplied approximately 5000 square meters vertical garden in China. (Source: RainSunWall website)

**Hannor**, established in 2000, is located in Shanghai as well. It provides service in rooftop waterproof & insulation and rooftop greenery & vertical garden. Having annual producing capacity of 1 million square meters vertical garden and 2 million square meters rooftop greenery, Hannor has strong competence. Except to producing the materials of vertical garden, the company also provides a whole set service including design, constructing, training and maintenance of vertical garden and rooftop greenery. Its products have been supplied to both foreign and domestic customers such as Canada Pavilion and Ireland Pavilion in Shanghai Expo, Louise Vuitton shop, the Great Hall of People, Industry and Commercial Bank of China, Vanke Real-estate, CITIC Real-estate, Landsea Real-estate and so forth. (Source: Hannor website)

**Runhe TianZe** is established in 2007 and located in Shenzhen. The company focuses on vertical garden, rooftop greenery, development and promotion of creative production of plants. Its vertical garden has got several notional patents. ((Source: Runhe TianZe website)

**Vertical Green** is from Singapore, which focuses on supplying indoor green wall to commercial buildings and private accommodations. The creative super thin and light growing carrier of the greenery strengthens its competence (weight: 20Kg/m<sup>2</sup>, thickness: 25mm). Easy assembly, automatic drip and fertilizing system and non-soil cultivation allow the company being high accepted by customers. (Source: Vertical Green website)

**Green Fortune** is a Swedish landscape engineering and design company, whose China subsidiary was established in 2010. Plantwall is the most popular product from the company which is a very similar product as FreshWall from NaturVention. Featuring with adjustable size, impression of beauty, air quality improvement, integrated drip irrigation system, automatic fertilization, programmed process and automatic control system, Plantwall has been penetrated to 16 countries so far with more than 400 walls done. In China, dozens of companies, institutes and organizations such as Alibaba, government offices, Industry and Commercial Bank of China are the customers of Green Fortune. (Source: Green Fortune website)

During the researching, I find out that there are very few companies only focus on vertical business as their core product. Majority cases are that the landscaping greenery construction companies also involve in vertical garden in a light effort, and they do not spend much capital and effort on research and development of vertical garden. The concept of vertical garden was introduced to China about 13 years ago, and it had a very slow development. It has been widely spread to people since 2011 Shanghai Expo, however, the development is still quite slow. From the official websites and blogs, the numbers of supplied green walls have been calculated.

Indeed, the collected data probably is not exact since some companies may not list out all their cases, whereas, it still can portrays the current market situation of vertical garden in China. TABLE 7 illustrates that only tiny piece of the vertical garden has been covered so far. In another word, the vertical garden business just starts in China market.

Company	Number of sold green walls
RainSunWall	5000 square meters
Hannor	66 walls
Runhe Tianze	34 walls
Family & Nature	5 walls
Vertical Green	No relevant data
Green Fortune	No relevant data

TABLE 7. The amount of sold green walls

I also notice that all those competitors are located in metropolitan cities such as Shanghai and Shenzhen, radiating to several wealthy cities nearby. The market of vertical garden in numerous other cities is still vacancy. Moreover, from Table 7, it can be see that there is no one dominates the market yet.

#### 4.6 Barriers and uncertainties

The concept of the vertical garden is known to a great number of Chinese people, but few samples can be seen in China. The benefit of the vertical garden has been explained before in the chapter 1.1. Now, what reasons prevent the Chinese people from enjoying the benefits from vertical garden? Hereby, I will explain my findings as follows.



### **Exorbitant cost**

Cost significantly influences the utilization of the vertical garden to potential customers. Taking a vertical garden project in Chongqing City as an example, a British company estimates the costs to be USD 1200 ( about 862 EUR) per square meter. The price of one FreshWall is approximate 3000-4000 EUR (said by Niko Järvinen). According to Mr. Yang (Founder of Family & Nature, a vertical garden supplier), cost of an imported green wall varies from CNY 1800-7000 per square meter (about 220-850 EUR) and the local one costing CNY 1800- 3500 per square meter (about 220- 420 EUR) excluding the plants carriers. (Family & Nature website, 2013) Besides the exorbitant purchasing price, the maintenance cost is also very high. According to the National Bureau of Statistics of China published, the annual urban disposable income pre capital is 24 565 CNY (about 3000 EUR) in 2012. (National Bureau of Statistics of China Official Website, 2013) Obviously, the price of a green wall is unaffordable to the majority of Chinese people.

### **Immature technology**

Basically, a vertical garden is a tiny eco system. All the species in the eco system should live together in a harmonious environment. It usually takes long time to reach a balance and form a steady biological chain. The vertical garden may fail before the balance can be reached as the technology is not advanced enough to ensure the harmonious growth amongst different species. Moreover, some suppliers are not able to use the non-soil cultivation. Underneath the traditional soil cultivation, small winged insects might be also fostered from the soil, which will definitely disturb people's normal life.

### **Stereotype**

In a modern society, people's life is manipulated by electronic devices. When talking about improving the air quality, diminishing PM2.5, and adjusting the air humidity, the first choice that comes to people's mind is always electronic devices such as an air purifier and humidifier. The dirty filters directly shows the users how those devices are working when are purifying the air, however, the plants in vertical garden are not able to give such obvious and quick results to prove that they have the same function as an electronic device. Thus, many people still don't think the vertical garden is a good option on improving air quality.

### **Misunderstanding of photosynthesis and respiration of plants**

Photosynthesis is a process used by plants to convert light energy, normally from the sun, into chemical energy that can be used to fuel the organisms' activities. Carbon dioxide and water are used to synthesize carbohydrates. At the same time oxygen is released. In another words, during day time plants inhale carbon dioxide and release oxygen. In respiration, plants convert the sugars back into energy for growth and other life processes. It is an opposite process of photosynthesis, from which the oxygen is consumed and carbon dioxide is released. Since plants consume oxygen during night by respiration, a great number of Chinese people refuse to have plants indoors because they believe that the air is getting worse during night as plants consume oxygen and release carbon dioxide. Dr. Lehtomaki (2013) who is a business development director from BioGTS, a partner of NaturVention, also mentioned this phenomenon to me. BioGTS has a project of residential buildings' urban, architectural and construction design in Northern China. They have tried to introduce vertical garden to their customers. One of the negative feedbacks they got about indoor vertical garden is that Chinese people believe that respiration of plants pollute air during night.

The barriers that limit the development of vertical garden market in China have been explored above. Other barriers and uncertainties of entering Chinese market for a

foreign company also need to be analysed. Cultural differences are definitely challenges to NaturVention when talking about entering to China market. Doing business well in China, you must have good 'guanxi' with government, relevant associations, customers, suppliers and so forth. Guanxi is a kind of people connection. In commerce, guanxi is very important since it is more important to know 'who' than to know 'what'. Relationships of all kinds, particularly with officials, are easier to establish and maintain a business, and many difficult problems can be solved easily if one has the appropriate guanxi. Another cultural difference NaturVention should pay attention to is 'Fengshui'. A big number of Chinese believe Fengshui and take the sayings from Fengshui as a very important guide when they arrange the layout of the house. If NaturVention can understand where is the best place to replace the FreshWall and explain what kind of benefit it will bring based on the Fengshui theories, it may give bigger possibility to gain the customer. Moreover, the plants having names implicating good meanings or wishes usually are highly welcomed and accepted by Chinese. For example, many Chinese people are fond of having 'jinqian shu' (money tree), 'facai shu' (getting rich tree) at home or in companies. They believe that those plants can bring good luck to them.

Language brings challenge as well. Although an increasing number of Chinese people can speak English which is the most possible common working language between China and Finland, only small amount of them can reach a smooth communication during working and most of them are centralized in foreign investment enterprises. Translator may be needed, however, communication transferred by a third party may cause misunderstandings. Without a direct and effective communication, business operation usually is very slow and difficult to reach the expectation. In addition, Chinese people believe that Chinese language is the most difficult one in the entire world, so, foreigners who speak fluent Chinese usually can gain friendship and trust easier, which helps the contract signing.

Bureaucracy is deep-rooted in China since it has had officials for all its recorded history. The Chinese bureaucracy is both extremely large and extremely complex,

with multiple overlapping layers that can be remarkably resistant to periodic, valiant restructuring efforts. However, since 1978 when China's economic reforms began, rapid economic growth is a national priority, which requires foreign investment. Many of the bureaucracy barriers have been cut away to pursue the goal. The overall tendency is a gradual shift toward-developed country norm, but the process still has a long way to go. An often brazen lack of compliance with central government directives by local agencies is another chronic problem. In practice, it often takes tremendous amount of time to obtain many permits, stamps, signatures, etc. that are needed to conduct business activities.

Market distance also brings barrier. There is about 10,000 KMs between China and Finland. Delivery of products cost considerable time and money. Existed local suppliers and foreign suppliers have already occupied a nice bit of the market; usually the one who strikes first gains the advantage. Besides, since the vertical garden is an emerging product in China whose market is not yet developed well, a good and trustful distributor may not be found easily.

One big part of FreshWall is plant. The company may face restriction when it exports plants to China. In the Law of the People's Republic of China on the Entry and Exit Animal and Plant Quarantine, the following provision can be seen:

*Article 2 Animals and plants, their products and other quarantine objects, containers and packaging materials used for carrying animals and plants, their products or other quarantine objects, as well as means of transport from animal or plant epidemic areas shall, on entry or exit, be subject to quarantine inspection in accordance with this Law. (Source: China.org.cn)*

Plants include cultivated plants, wild plants, their seeds and seedlings and other propagating materials. The FreshWall contains plant and propagating materials, therefore, NaturVention may fail to export the whole FreshWall to China.

#### **4.7 Business environment of Finnish CleanTech firms in China**

Finnish CleanTech is well known in the field of bio energy, recycling, green building, etc. Meanwhile Finland is attempting to develop CleanTech in order to acquire the leading position in the world. China, as a developing country with limited resource and environment problem resulting from the rapid industrialization and urbanization, is eager to pursue an energy efficient and environment friendly developing mode. A CleanTech seminar has been often held between China and Finland.

The cooperation in the field of CleanTech between the two countries has been conducted since 2010. The chiefs of state of both China and Finland have taken part in CleanTech seminars each time, which shows that the CleanTech cooperation has been considered important. Li Keqiang, the Premier of China, encourages foreign investment in China in the field of clean technology, equipments and products, and advocates a fair competition between local companies and foreign companies. A project named 'Beautiful Beijing' is proceeding now conducted by a team including the relevant experts from Finland and China. Target of the project is to explore effective methods of improving the air quality in Beijing supported by the Finnish advanced clean technology. Mr. Jyrki Katainen, prime minister of Finland, has taken part in the CleanTech seminar in 2013 and introduced 28 CleanTech firms in China. (Source: Article "A seminar concerning Clean-Tech between China and Finland" on website [www.ce.cn](http://www.ce.cn))

## 5 CONCLUSIONS

The aim of this study was to research the market situation of solutions of indoor air pollution especially vertical garden, considering from multiple aspects, which can portraits a holistic picture of the market for NaturVention. The researching topics were derived from the theory review and emerged through the primary and secondary data collection. The market conditions of solutions of indoor air pollution, the potential customer segments, competitors' situation, and uncertainties and barriers were researched by collecting secondary data, and the buyer decision process was explored by conducting interviews.

The research results show that the indoor air quality is remarkably poor, with a severely negative influence on people's living conditions. Improving the air quality is an urgent need in China, particularly in those cities where the air quality is gradually getting worse since industrialization is processing rapidly. It means that there is an enormous market for air improvement solutions. Albeit the mainstream of the solutions comprises electronic air purifiers nowadays in China, the vertical garden can still gain some market shares since it is a natural, ecological and sustainable method and has additional functions such as aesthetics, humidity adjustment and so forth besides air improvement. Some academic publications have already encouraged people to adopt the vertical garden as an approach to improve the air quality in China. Several successful cases like the green walls at the Shanghai Expo, a well-designed and the breathing-taking green wall in the office of Bosch and Siemens Home Appliances Group have introduced the concept of green wall to an increasing number of people. A more optimistic issue is that the Chinese government endorses the function of the vertical garden and promulgates their policies to promote it. Moreover, the statistics from each market segments implies a huge potential of green walls.

The first local vertical garden company was established in 2000, at that time the vertical garden was still facing a completely new market in China. The Shanghai Expo in 2010 unveiled the mask off the vertical garden and introduced this concept to a great number of people as there were green walls at displaying in several pavilions. As many as 73.1 million people visited the Expo (Expo2010 Official Website, 2010). The impressive and newfangled green walls attracted a tremendous number of people. After that, numerous garden landscape engineering companies started to expand their business also to the green wall, and meanwhile many new vertical garden companies were founded. Moreover, some foreign vertical garden suppliers also noticed the business opportunity in China and entered the market there. However, during the short period after the vertical garden had been widely introduced to the Chinese, the market has not been growing dramatically fast. Figure 6 shows that the supplied products compared to the needs just resemble a drop in a bucket. There is still huge market needed to be explored. Even though all the local and foreign suppliers are working on seizing the market share, it is not too late for NaturVention to enter the market as only tiny piece of the market share has been seized with no company dominating the market yet.

Most of the local suppliers and existing foreign suppliers are stationed in Shanghai and Shenzhen, radiating to the nearby cities and operating offices or branches in several south-east cities where people are more wealthy. As is known to all, China is a huge country with more than 656 cities and over 1.35 billion people, there are still numerous cities are not yet covered by those competitors.

Potential customers to NaturVention are disclosed in this study. Since NaturVention mainly focuses on the following segments in Finland: education sector, healthcare sector, beauty and wellbeing sector and sports sector, I spend effort on researching statistics data on those market segments. Besides those, the enterprise sector and government sector are also interested segments to NaturVention. The figures show that they are remarkable big potential customer groups. During the research I also realize that Chinese wealthy class who pursues luxury products enthusiastically might

be another segment because they would like to enjoy high quality life and prefer foreign products.

Barriers and uncertainties are uncovered in this study from two angles: those limiting the development of the market and those affecting the entries. Overcoming or avoiding those barriers and uncertainties will help NaturVention to enter China market more smoothly. Admittedly, the company will face more other barriers and uncertainties during the whole process of entering, which the company has to aware and carefully deal with.

The interviews were conducted to study the buyer decision process. All interviewees are well selected who are from different target segments of NaturVention and most of them are managements of the organization who have power to decide or influence the purchase. Clearly from the answers, there is need of air improvement solutions, while vertical garden is the preferred one as it is natural, environmental friendly, artistic, etc. To see a sample is the preferred way for them to get knowing about the product, while the technology, price, installation and maintenance are the factors they care the most when make buying decision. Western brands draw more interest since they believe that the western brands have more advanced technology and customer service.

Moreover, the Finnish CleanTech cluster has already stepped into China. Through the seminars, ongoing projects, and other business activities, Finnish CleanTech products are gradually gaining popularity and being accepted by the Chinese people. The advanced technology and good reputation have been paving the way for NaturVention to enter the Chinese market.

## **6 VALIDITY AND RELIABILITY**



Kothari (2004, 74) says that validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure. Simply put, it refers to the concept that the findings make sense and answer the research questions. During the research, I keep this concept in mind and try to find out correct secondary data from viable sources. I have sufficient proper findings to give answer to those research questions and I believe the results meet the objectives. However, since vertical garden is an emerging issue to Chinese and FreshWall has not been entered to China yet, I am not able to find direct information of market demand about them in China because very few related data can be found. A more general level of market demand about environment protection solutions has been researched and air purifier market demand has been researched to provide NaturVention a comparison.

Reliability refers to the trustworthiness of the measurement in the research. (op.cit.p.74). Reliable finds can be replicated or reproduced by another inquirer. (Yin, 2003). In order to increase the reliability in this research, I collect data from competent and trustworthy sources. A paid membership has been taken by me to Baidu Wenku, the biggest and best online written documents database in China, from where I got all the relevant academic publications including research, thesis, and journals on the topic of indoor air quality and vertical garden in China. Besides, official websites and blogs of NaturVention and its local and foreign competitors, main online newspapers, official websites of architecture, municipal government, greenery and landscape are also the sources I use to get data. Most of the quantitative data are from National Bureau of Statistics of China. I mainly use the trustworthy secondary data and benefit from email exchange and informal conversation which are only supplementary source since they may bear biases in this methodology. But, the table of numbers of sold green walls is counted by me from competitors' websites. It might not show the exact numbers of sold products of the companies, I believe that it still be able to explain the situation in general. Regard to the interview, Saunders et. All (2009, 156) assert that the possible threat may be subject or participant bias. Participant bias can be explained as an unwillingness of

respondents to give honest answers because of the threat of spoiling relationship with their business partners. In this case, there is no such business relationship existing, hence, I believe their answers are quite reliable and valuable to NaturVention.

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## APPENDICES

### Appendix 1. Air quality index

AQI	Air Pollution Level	Health Implications
0 - 50	Good	Air quality is considered satisfactory, and air pollution poses little or no risk
51 -100	Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
101-150	Unhealthy for Sensitive Groups	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
151-200	Unhealthy	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects
201-300	Very Unhealthy	Health warnings of emergency conditions. The entire population is more likely to be affected.
300+	Hazardous	Health alert: everyone may experience more serious health effects

Appendix 2. Evaluation of the factors affecting foreign market entry mode decision for NaturVention in the case of entering China

Criteria	Factors	Evaluation of NauturVention
<b>Internal factors</b>	Firm size	Small company with close to 20 employees
	International experience	yes
	Product complexity	Extremely, completely new market
	Product differentiation advantage	One of a kind and patented.
<b>Desired mode characteristics</b>	Risk averse	Moderate risk
	Control	Control over strategic decisions (marketing, who to sell etc)
	Flexibility	High
<b>Transaction-specific factors</b>	Tacit nature of know-how	High, much quiet knowledge concerning sales/marketing and maintenance
	Opportunistic behaviour + transaction costs	Rather high in the beginning.. Working with living plants so cost to entry is high.

<b>External factors</b>	Sociocultural distance between home country and host country	Big
	Country risk/ demand uncertainty	Country risk is medium, demand uncertainty is relatively low due to huge air pollution problems
	Market size and growth	China is a big potential market, but growth is not accelerated yet
	Direct and indirect trade barriers	Plants might cause some unforeseen questions
	Intensity of competition	Local competitors and foreign competitors are existing in China market
	Small number of relevant export intermediaries available	Yes

### Appendix 3. Interview questions (English)

Thanks for accepting my interview. I am a student from JAMK University of Applied Science, and I'm doing a research now for my thesis. The purpose of this interview is to explore buyer decision process concerning green wall which is a product used to improve indoor air quality, adjust indoor humidity and add artistic.

1. Could you please simply introduce your working place and your position?
2. How do you evaluate the indoor air quality in your working place and you home? In your opinion, is it necessary to install any devices to improve the air quality?
3. Which one from the following air improvement solutions do you prefer? Please explain the reasons.
  - Electronic products (i.e. air purifier, filter, humidifier, etc.)
  - Floristic products (i.e. potted plants, green walls, etc.)
4. Have you heard about green walls before?
5. Which channel do you prefer getting information about green walls?
  - TV, radio
  - Traditional paper media (newspapers, interior decoration magazines, environmental protection magazines, etc.)
  - Social media
  - Internet searching
  - Recommendation from friends
  - To see a sample
6. Which factors do you think are important when you select the supplier of green wall?
  - Reputation on the market

- Advanced technology
- Be able to provide customized products
- Installation and maintenance
- Others, please specify them

7. Which factors do you think are important when you select a green wall from the pool of similar products?

- Brand
- Technology
- Price
- Use life
- Others, please specify them

8. Which supplier do you prefer: the western suppliers or local suppliers? Could you please explain the reasons?

#### Interview questions (In Chinese)

您好,感谢您接受我的采访.我目前在为一家芬兰的垂直绿化公司做中国市场调查,以此来做为我的毕业论文课题.该公司的拳头产品为植物墙,其主要功能是改善室内空气,另外也起到空气湿度调节和室内美化的目的.

1. 能否简单介绍一下您的职位以及所供职的单位?
2. 您怎样评价您工作或者居住的环境里的室内空气质量?在您看来是否需要安装改善室内空气的设备?
3. 下列改善室内空气的产品,您更倾向于哪一种?为什么?
  - 电子类设备(如空气净化器,过滤器,加湿器等)
  - 植物类产品(如盆栽,植物墙等)

4. 您以前是否听说过植物墙?
5. 您希望通过什么渠道来了解植物墙?
  - 电视广播广告
  - 传统纸媒 (报纸,家装杂志,环保杂志)
  - 社交媒体
  - 网络搜索
  - 朋友推荐
  - 在别处见到的植物墙实例
6. 在选择植物墙供应商时,下列哪些因素您认为比较重要?
  - 市场知名度
  - 先进的技术
  - 可为客户量身定做产品
  - 安装和维护
  - 其他,请详述
7. 在做购买植物墙决定时,下列哪些因素您认为比较重要?
  - 品牌
  - 技术
  - 价格
  - 使用寿命
  - 其他,请详述.
8. 欧美供应商和本土供应商,您更倾向于哪一个?为什么?